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No. Sho 52[1977]-93122

IMITATION MORTAR LYSINE SURFACE-SHAPED COATED METAL PLATE

Takashi Ishikawa

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IMITATION MORTAR LYSINE SURFACE-SHAPED COATED METAL PLATE

[Mojo morutaru rishin menjo himaku kinzokuhan]

Inventor: Takashi Ishikawa

Applicant: Takashi Ishikawa

[There are no amendments to this patent.]

Claims

1. An imitation mortar lysine surface-shaped coated metal plate, characterized by the fact that a base coat is formed on at least one surface of a base material; powder granules of about 0.1-2 mm are dispersed on said coat; said powder granules are coated with an overcoat containing at least one kind of resin selected from acrylic resin, oil-free polyester resin, and unmodified urethane resin, and silicon resin and containing no pigment or containing a slight amount of pigment to a paint solid fraction.

2. The imitation mortar lysine surface-shaped coated metal plate of Claim 1, characterized by the fact that the base material is a surface-treated steel plate or an embossed plate.

3. The imitation mortar lysine surface-shaped coated metal plate of Claim 1 or 2, characterized by the fact that the powder granules are colored.

4. The imitation mortar lysine surface-shaped coated metal plate of Claim 1, 2, or 3, characterized by the fact that the base coat and the overcoat are formed of the same raw material.

Detailed explanation of the invention

The present invention pertains to an imitation mortar lysine surface-shaped metal plate which has corrosion resistance and in which the coldness peculiar to a metal plate is suppressed in the surface.

In metal plates such as cold-rolled steel plates, galvanized [illegible] plates, aluminum plates, and stainless steel plates, so-called precoated metal plates being formed by coating a paint once on its coil or sheet or coating a paint twice by coating an anticorrosive undercoat and coating a topcoat and baking the coat for a short time under a high-temperature condition have been well known. It has already been well known that these plates can be used as facing construction materials such as roofing materials and facing materials under an external exposed environment. However, in these paints, especially topcoat materials, choking occurs at a unit of 2-5 years in an external exposed environment, so that colors were changed.

In order to improve the durability of these precoated metal plates, the development of resins and paints has been advanced. For example, as well known, paints are prepared by mixing resins with high durability such as silicon resin, fluororesin, vinyl chloride resin, and its modified resins with colored pigments, anticorrosive pigments, plasticizers, etc., and high-quality precoated metal plates are manufactured by coating the paints.

However, these high-durability paints are generally expensive, or even if the unit price is low, a thick film coating is required to obtain a desired durability. Thus, the final price of precoated metal plates is largely raised, compared with that of general topcoat materials using alkyd resin, oil-free polyester resin, acrylic resin, and its modified resins. Therefore, in actuality, these paints are used only in very limited fields and are far from the supply stage.

Also, along with pigments that have already been included, silicas, perlite grains, ceramic ware segments, glass granules, etc., dispersed to improve the coldness of the metal plates further roughen the coated structure. In other words, the coats do not have flat surfaces which are preferable in terms of weather resistance but have a rough structure of projections and recessions, and pinholes and gaps, which are generated in the coat-baking process in the contact part of the granules and the paints and difficult to be discriminated by the naked eye, are easily generated. Then, these parts become paths for the permeation of water containing impurities, so that the coats are broken, and the metal matrixes are rusted.

The present invention provides an imitation mortar lysine surface-shaped coat metal plate in which the coldness of the metal plate is removed and the fracture of a coat, which is easily generated, is improved by dispersing powder granules.

Next, using the figures, an application example of the imitation mortar lysine surface-shaped coat metal plate (hereinafter, simply called a metal plate) of the present invention is explained in detail. 1 is a base material, 2 is a base coat, 3 is a granule, and 4 is an overcoat. As the base material, surface-treated steel plate, simple iron plate, steel plate, aluminum plate, and stainless steel plate are used. As the raw material for the above-mentioned base coat, a paint in which a resin solution mainly composed of at least one kind of resin selected from a group comprised of epoxy resin, oil-unmodified polyester resin, acrylic resin, urethane resin, and these modified resins and colored pigments, anticorrosive pigments, extenders, etc., are mixed or a paint composed of the same material as that of the overcoat, which will be mentioned later, is used. Also, this coat initially holds the powder granules at dispersing positions and has an action of uniformly forming a corrosion-resistant layer. The above-mentioned powder granules 3 are silica with a size of about 0.1-2 mm, ceramic ware segments, glass granules, granulated substances, other inorganic powder granules, and substances colored with these materials. Also, the overcoat 4 is a thin resin layer (coat) containing no pigment or containing only a very small amount of pigment (a pigment with a volume concentration of 1% or less of the paint solid fraction). For this layer, (1) an exposed part from the base coat of at least the powder granules is coated, and (2) the base coat, the overcoat, and the powder granules are formed as an integrated layer. At that time, each above-mentioned constitutional layer is formed at least to a certain extent. (3) Gaps, pinholes, etc., should be difficult to be generated on the overcoat surface, and projected and recessed surfaces with excellent weather resistance should be formed. As the resin components of such a pigment, acrylic resin, resins mainly composed of a combination of acrylic acid, oil-free polyester resin, or acrylic resin and an oil-free polyester copolymer and a melamine resin, resins mainly composed of a combination of acrylic resin, silicon resin modified with an oil-free polyester resin, and an amino resin, one-liquid sulfur-unmodified polyurethane resins composed of a polyol component and a block isocyanate such as acrylic resin and polyester resin or two-liquid sulfur-unmodified polyurethane resins composed of a polyol component and an isocyanate component, etc., are mentioned. According to the experiments of this inventor, among the above-mentioned resins, especially, in resins mainly composed of a silicon-modified resin such as silicon polyester resin and silicon acrylic resin, the gloss retention rate and the [illegible] resistance are excellent, compared with other resins mainly composed of acrylic resin, oil-free polyester resin, and polyurethane resin.

This paint composition has excellent durability because (a) gaps such as pinholes are very few on the overcoat surface, (b) since the pigment is slightly included or is not included, the

isolation ratio of the pigment from the resin layer through the fracture of the resin due to ultraviolet rays of a solar beam is small or zero (transparent resin), etc. In other words, in (b), the resin layer is reliably formed on the surface. Also, in the present invention, since the thickness of the coat of the final layer has an influence on the price of the product and the durability under an external exposure environment, it must be especially carefully controlled.

Next, the manufacturing method is briefly explained.

First, the pigment (base coat) containing a pigment is coated at a thickness of about 70 μ (wet) on the base material by any of well-known methods such as roll coat, spray coat, curtain flow coat, and brush coat. For example, silica (150 mesh) is uniformly dispersed via a disperser or a manual sieve on it. Also, in this case, the base coat is still not dried, however recessed parts are also formed by dropping silica from a height of about 30 cm in a state having slight flowability. The silica is embedded up to about the half position, and the paint is immediately drawn near it, so that no gap is formed between the silica and the paint. Accordingly, the overcoat with the above-mentioned composition is spread on the silica via any of the above-mentioned means. The amount being spread is about 10-20 μ in an approximately wet state. After evaporating the solvent for about 10 min in a heating furnace at 65-100°C, the overcoat is baked for about 1-2 min in a high-temperature heating furnace at 200-300°C.

Next, an application example is explained. Figure 1 shows a metal plate on which a paint mainly composed of an epoxy resin was spread at about 60 μ (wet) on an iron plate (0.27 mm in thickness), silica was dispersed at a mesh of about 100 on it, and acrylic resin was spread at about 10 μ (wet) on it. In Figure 2, a coat with a structure similar to that of Figure 1 was formed on the surface of a colored steel plate (a polyester group colored coat of about 10-25 μ) 2' as a base material. In Figure 3, a colored steel plate as a base material was embossed, and the other constitution was similar to that of Figure 1. These manufacturing methods were carried out by the above-mentioned processes.

Accordingly, compared with conventional products, the service life was almost doubled in the experiment in terms of weather resistance in this product. Also, the coldness of the metal plate was nearly solved, and the design was largely improved. In particular, in spite of a distinct pattern of projections and recessions, the weather resistance could be clearly improved in the overcoat without a pigment.

As explained above, in the metal plate of the present invention, (i) the separation of a pigment of the surface layer is suppressed by coating a colored coat, and a dense resin layer without a small pigment content is coated, so that the permeation passage of water is shielded. Also, high chalking characteristic and corrosion resistance which have not been considered at all at the conventional cost can be achieved, and about the same high durability as that of an expensive silicon resin-modified paint can be achieved. (ii) The film thickness of the base coat

can be thinned by coating the above-mentioned overcoat. (iii) In the final layer, the concealability is the lowest limit of the film thickness of the colored coat. In the present invention, since the function of the colored coat is mainly coloring in a certain kind of base coat, the existence of gloss is not required, and for this reason, compared with the conventional topcoats, the concealability can be further improved. Therefore, the film thickness can be more thinned. In other words, according to the present invention, the durability can be considerably improved under an external exposed environment by controlling the total film thickness to a value similar to that of conventional precoated metal plates or by slightly increasing the thickness, thus without largely raising the material cost. (iv) Since the separation of powder granulates from the coat is due to the above-mentioned coat composition, the outer surface of the powdered granules is coated at a uniform thickness, and the formation of projections and recessions due to the pigment in the coated surface is little, so that a desired pattern in terms of weather resistance and design can be directly obtained.

Brief description of the figures

Figures 1-3 are illustrative diagrams showing one cross section of the imitation mortar lysine surface-shaped coated metal plate of the present invention.

1 Base material
2 Base coat
3 Powder granule
4 Overcoat

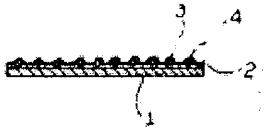

Figure 1

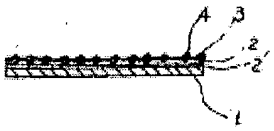

Figure 2

Figure 3